Precalc Warm Up # 8-3

Turn in extra credit

1. Find tan x given that sec x = -3/2 and tan x > 0. Use quadrant placement and a right triangle. Then do it again using a pythagorean identity.

2. True or false?

$$\frac{x}{a+b} = \frac{x}{a} + \frac{x}{b} \qquad\qquad \frac{a+b}{x} = \frac{a}{x} + \frac{b}{x}$$

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5. $\tan x = \frac{5}{12}$, $\sec x = -\frac{13}{12}$

6. $\cot \phi = -3$, $\sin \phi = \frac{\sqrt{10}}{10}$

$\boxed{7.}$ $\sec \phi = -1$, $\sin \phi = 0$

8. $\cos\left(\frac{\pi}{2} - x\right) = \frac{3}{5}$, $\cos x = \frac{4}{5}$

9. $\sin(-x) = -\frac{2}{3}$, $\tan x = -\frac{2\sqrt{5}}{5}$

8) $\cos\left(\frac{\pi}{2} - x\right) = \sin x$

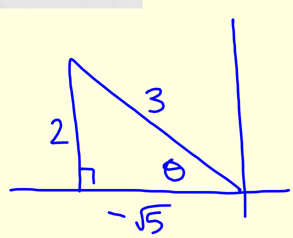
So: $\sin x = \frac{3}{5}$

sin & cos + in Quad I...

$\sin(-x) = -\sin x$

So: $\sin x = \frac{2}{3}$

sin + } in Quad II
tan − }



10. $\csc x = 5, \quad \cos x > 0$

$\boxed{11.}$ $\tan \theta = 2, \quad \sin \theta < 0$

12. $\sec \theta = -3, \quad \tan \theta < 0$

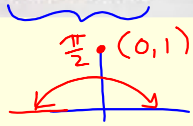
13. $\sin \theta = -1, \quad \cot \theta = 0$

14. $\tan \theta$ is undefined, $\underbrace{\sin \theta > 0}$

$\tan \rightarrow \frac{y}{x}$

undef. where $x = 0$

@ $\frac{\pi}{2}, \frac{3\pi}{2} \ldots$



Fundamental Trig Identities

(True for all values of the variable in the domain.)

Reciprocal Identities $\longrightarrow$ $\sin x = \frac{1}{\csc x} \quad \ldots$

Tangent and Cotangent Identities $\tan x = \frac{\sin x}{\cos x}$

Pythagorean Identities

$\sin^2 x + \cos^2 x = 1$

$1 + \tan^2 x = \sec^2 x$

$1 + \cot^2 x = \csc^2 x$

Cofunction Identities

$\sin\left(\frac{\pi}{2} - x\right) = \cos x$

$\cos\left(\frac{\pi}{2} - x\right) = \sin x$

sec & csc behave the same way!

$\tan\left(\frac{\pi}{2} - x\right) = \cot x \quad \ldots$

Negative Angle Identities

$\sin(-x) = -\sin x$

$\cos(-x) = \cos x$

$\tan(-x) = -\tan x \quad \ldots$

The identities can be used to help solve equations and simplify expressions. Don't overlook the power of Algebra! It is often the best tool of all!

Goal: One trig word & no fractions if possible.

Simplify Examples:

1. $\dfrac{1-\cos^2 x}{\sin x}$

use pyth identity
$\sin^2 x + \cos^2 x = 1$
$\sin^2 x = 1 - \cos^2 x$

$\dfrac{\sin^2 x}{\sin x}$

$\dfrac{(\cancel{\sin x})(\sin x)}{\cancel{\sin x}}$

$\boxed{\sin x}$

2. $\cos^2 x\,(\underbrace{\sec^2 x - 1})$

$1 + \tan^2 x = \sec^2 x$
$\tan^2 x = \sec^2 x - 1$

$\cos^2 x\,(\tan^2 x)$

$\dfrac{\cancel{\cos^2 x}}{1}\left(\dfrac{\sin^2 x}{\cancel{\cos^2 x}}\right)$

$\boxed{\sin^2 x}$

How could you check?

3. $\cos^4 x - \sin^4 x$

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difference of squares!

$(\cos^2 x)^2 - (\sin^2 x)^2$

$(\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x)$

$(1)(\cos^2 x - \sin^2 x)$

pyth. identity:

$\sin^2 x + \cos^2 x = 1$

$\cos^2 x = 1 - \sin^2 x$

← replace

$1 - \sin^2 x - \sin^2 x$

$\boxed{1 - 2\sin^2 x}$

$\cos^2 x - (1 - \cos^2 x)$

$2\cos^2 x - 1$

4. $\dfrac{\cos\theta}{\sin\theta} + \dfrac{\sin\theta}{1+\cos\theta}$

5. $\sin b + \cot b \cos b$

4. $\frac{(1+\cos\theta)}{(1+\cos\theta)}\frac{\cos\theta}{\sin\theta}+\frac{\sin\theta}{1+\cos\theta}\cdot\frac{\sin\theta}{\sin\theta}$

$$\frac{\cos\theta + \cos^2\theta + \sin^2\theta}{\sin\theta(1+\cos\theta)}$$

$$\frac{(\cos\theta \cancel{+1})}{\sin\theta(1+\cancel{\cos\theta})}$$

$$\frac{1}{\sin\theta}$$

$$\boxed{\csc\theta}$$

5. sin b + cot b cos b

$$\frac{\sin b}{1} + \frac{\cos b}{\sin b}\cdot\frac{\cos b}{1}$$

$$\frac{\sin^2 b}{\sin b} + \frac{\cos^2 b}{\sin b}$$

$$\frac{\sin^2 b + \cos^2 b}{\sin b}$$

$$\frac{1}{\sin b}$$

$$\boxed{\csc b}$$

6. Rewrite so that the expression is NOT a fraction

$$\frac{5}{\tan x + \sec x}$$

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$$\frac{5}{\tan x + \sec x} \cdot \frac{\tan x - \sec x}{\tan x - \sec x}$$

$$\frac{5(\tan x - \sec x)}{\tan^2 x - \sec^2 x}$$

$1 + \tan^2 x = \sec^2 x$

$$\frac{5(\tan x - \sec x)}{\tan^2 x - (1 + \tan^2 x)}$$

$$-5(\tan x - \sec x)$$

7. Simplify

a. $\dfrac{\sin(-x)}{\cos\ x}$

b. $\cot(\frac{\pi}{2} - x)\cos x$

7. Simplify (Replace Neg. Angles & cofunctions first!)

a. $\frac{\sin(-x)}{\cos\ x}$

$-\frac{\sin x}{\cos x}$

$\boxed{-\tan x}$

b. $\cot(\frac{\pi}{2}-x)\cos x$

$\tan x\ \cos x$

$\frac{\sin x}{\cancel{\cos} x}\cdot\frac{\cancel{\cos} x}{1}$

$\boxed{\sin x}$

8. Use factoring to simplify

$1 - 2\cos^2 x + \cos^4 x$

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$(\cos^2 x)^2 - 2(\cos^2 x) + 1$

Let $y = \cos^2 x$

$y^2 - 2y + 1$

$(y - 1)^2$

$(\cos^2 x - 1)^2$

$\left(\cos^2 x - (\sin^2 x + \cos^2 x)\right)^2$

use $1 = \sin^2 x + \cos^2 x$

$(\cos^2 x - \sin^2 x - \cos^2 x)^2$

$(-\sin^2 x)^2$

$\boxed{\sin^4 x}$

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(use identities on #3, 7, 11)